the two kinds of air may be de-composed, and a highly dephlogisticated nitrous acid, as mine always was, procured.—This, being formed, will, of course attach itself to any snow or hail that may be forming in the same region at the same time, and by this means be brought down to the earth; confirming, in this unexpected manner, the vulgar opinion of nitre being contained in snow. Wishing that a fact of so extraordinary a nature, and which has probably more important consequences that I can foresee, may be farther investigated by your presenting this communication to the Philosophical Society.

I am, Dear Sir,

Your's sincerely, &c.

JOSEPH PRIESTLEY.

Northumberland, Nov. 21st, 1803.

Dr. C. Wistar, one of the V. P. of the A. P. S.

No. XXVI.

A Letter on the supposed Fortifications of the Western Country, from Bishop Madison of Virginia to Dr. Barton.

Read Dec. 16th, 1803.

DEAR SIR,

HAVING lately visited that beautiful river, the Kanhawa, and a considerable part of the country, within its neighbourhood, an opportunity was afforded of examining with attention some of those remarkable phænomena, which there present themselves, and which have been so much the subject of conversation, and of literary discussion. To remove error of whatever kind, is, in effect, to promote the progress of intelligence; with this view, I will endeavour to prove to you, that my journey has enabled me to strike one, at least, from

that long catalogue, which so often tortures human ingenuity.

You have often heard of those remarkable fortifications with which the western country abounds; and you know also, how much it has puzzled some of our literati, who supposed themselves, no doubt, most profound in historical, geographical and philosophical lore, to give a satisfactory account of such surprising monuments of military labour and art. Some have called to their aid the bold and indefatigable Ferdinand Soto; others, the fabulous Welch Prince of the 12th, century; and all have made a thousand conjectures, as lifeless as either Soto, or the Prince. Had they first examined into the fact, and endeavoured to settle this most essential pre-requisite, they would soon have seen, that the inquiry might be very easily terminated; and, that what had so greatly excited the *admiration of the curious*, existed only in their own imaginations. No one was more impressed, than myself with the general opinion, that there did exist regular and extensive fortifications, of great antiquity, in many parts of that vast country, which is watered by the various tributary streams of the Ohio, and the Mississippi. The first specimen which I beheld, was examined with an ardent curiosity, and with a full conviction, that it was the work of a people, skilled in the means of military defence. The appearance is imposing; the mind seems to acquiesce in the current opinion, and more disposed to join in a fruitless admiration, than to question he reality of those fortifications. But, as my observations were extended, and new specimens daily presented themselves, the delusion vanished; I became convinced, that those works were not fortifications, and never had the smallest relation to military defence. The reasons upon which this conviction, so contrary to that which has been generally received, was founded, I shall now submit to your consideration. Only, let me first observe, that those supposed fortifications differ as to area and form. Some are found upon the banks of rivers, presenting a semi-ellipse, the greater axis running along the banks: others are nearly circular, remote from water, and small; their diameters seldom exceeding forty or fifty yards. The first of these species is the largest;

their longer axis, at a mean rate, may be estimated at 250 yards; their shorter, at 200 or 220. It is said, and I believe upon good authority, that some have been found large enough to comprehend 50 acres, and even more. Some are also reported to be square; but I did not see any of that form. I shall confine myself to those which I have seen, and which are to be met with in the low grounds of the rivers Kanhawa, Elk, and Guyandot, or their adjacent uplands; though I am persuaded, the conclusion which I undertake to establish will be applicable to all those works, which have been dignified with the appellation of fortifications, in whatever part of the western country they may be found; since, from the information which I have obtained, there are certain striking features in which they all agree, and which indicate one common origin and destination.

1. Those works were not designed for fortifications, because many of them have the ditch within the enclosure, and because, the earth thrown up, or the supposed parapet, wants the elevation necessary for a defensive work. Both these circumstances occur, without exception, so far as my observations went, in all those which present an entire, or nearly a regular circle. The imaginary breast-work induces a belief, that it never exceeded four or five feet in height. At present, the bank seldom rises more than three feet above the plain; and it is well known, that in ground which does not wash, a bank of earth, thrown up in usual way, will lose very little of its height, in a century, or twenty centuries; one fourth for depression would be more than a sufficient allowance. But, we will not rest our argument upon what may, perhaps, be deemed a disputable point. The ditch, even at this day, affords, a certain criterion by which me may judge of the original elevation of the bank. Its width seldom exceeds four feet, at its margin; its depth is little more than two feet. Such a ditch, making every allowance for the operation of those causes, which tend continually to diminish its depth, whilst some of them are at the same time, increasing its width, could not have yeilded more earth, than would form a bank of the elevation mentioned. If the width, now, be not greater than

that ascribed, we may be assured, that, originally it was a very trifling fosse. But you will naturally ask; are there not some found which present a different aspect, and which evidence more laborious efforts? no, on the contrary, it is remarkable, that the kind of which I am now writing have as constant a similarity to each other, as those rude edifices, or cabins, which our first settlers rear. The description of one will answer for all; there is no anomaly, except, now and then, in the diameter of the circle; and here, the variation will only amount to a few yards.

Permit me now to ask, whether the military art does not necessarily require, that the ditch should be *exterior;* and, whether, among any people advanced to such a degree of improvement in the arts, as to attempt defensive works by throwing up earth, a single instance can be adduced in which the ditch has not an exterior position. Again, can we believe, that a work, having a bank or a ditch, not higher or deeper than I have mentioned, could be intended as a fortification? The moment which gave birth to the idea of a defensive work would also shew, that it must, in its execution, be rendered adequate to the end contemplated. It is scarcely worth while to go back to Livy or Polybius, upon this occasion. But they both inform us, "that the Romans, in the early period of their warfare, dug trenches, which were, at least, eight feet broad by six deep; that they were often twelve feet in breadth; sometimes, fifteen or twenty; that, of the earth dug out of the fosse, and thrown up *on the side of the camp,* they formed the parapet, or breast-work; and to make it more firm, mingled with it turf, cut in a certain size and form. Upon the brow of the parapet, palisades were also planted, firmly fixed and closely connected." The form of the fortification was always square. System appears to have been the tutelar Deity of the Romans. They always proceeded upon one plan. As to the form, indeed there appears to be no reason why that should not vary, not only among different nations; but with the same nation, as different situations might require. The Greeks generally preferred the round figure; but with them, the nature of places decided the question as to form. In

other respects, the decision must be made according to fixed and unalterable principles. The same reasons which determined every particular as to height, depth, and position of the earth thrown up, among the Romans, would equally determine the conduct of any other nation. What defence required; what would oppose a sufficient obstacle to human agility, was the point to be decided; and this point would be decided in nearly the same manner by every people unacquainted with gun-powder. The decision would not admit of such fosses and parapets as we find dispersed over the western country. Man in this new world, has lost no portion of his former agility.

2dly. Because, near to most of these imaginary fortifications and I think I may say, near to every one, which is formed upon the plan first mentioned, in a direct line with the gateway, you will find a mound, of an easy ascent, and from 10 to 20 feet in height. These mounds effectually command the whole enclosure. There is not a missil weapon, which would not, from the height and distance of the mound, fall within the fortification; nor would they fall in vain. But, to rear a fortification, and then build a castle or mound without, at the distance of 40 or 50 yards, which would give to an enemy the entire command of such a Fortification, would be as little recommended by an Esquimaux, as by a Bonaparte. The truth is, no such blunder has been committed; there is no such discordancy of means to be here found. On the contrary, we may trace a perfect harmony of parts. Those mounds are, universally cemeteries. Wherever they have been opened, we find human bones, and Indian relicks. They have grown up gradually, as death robbed a family of its relatives, or a tribe of its warriors. Alternate strata of bones and earth, mingled with stones and Indian relicks, establish this position. And hence it is, that we find near the summit of those mounds articles of European manufacture, such as the tomahawk and knife; but never are they seen at any depth in the mound. Besides, it is well known, that among many of the Indian tribes, the bones of the deceased are annually collected and deposited in one place; that funeral rites are then solemnized with the warmest

expressions of love and friendship; and that this untutored race urged by the feelings of nature, consign to the bosom of the earth, along with the remains of their deceased relatives and friends, food, weapons of war, and often those articles which they possessed and most highly valued, when alive. This custom has reared beyond doubt, those numerous mounds. Thus instead of having any relation to military arrangements, or involving the absurdity before mentioned, they furnish, on the contrary, strong evidence, that the enclosures themselves were not destined for defensive works; because, reared as these mounds have been by small, but successive annual increments, they plainly evince that the enclosures, which are so near to them, have been, not the temporary stations of a retiring or weakened army, but the fixed habitation of a family, and a long line of descendants.

That these mounds, or repositories of the dead, sometimes also, called barrows, were formed by deposition of bones and earth, at different periods, is now rendered certain by the perfect examination to which one of them, situated on the Rivanna, was subjected by the author of the Notes on Virginia. His penetrating genius seldom touches a subject without throwing upon it new light; upon this he has shown all that can be desired. The manner in which the barrow was opened, afforded an opportunity of viewing its interior with accuracy. "Appearances, says he, certainly indicate that it has derived both origin and growth from the accustomary collection of bones, and deposition of them together; that the first collection had been deposited on the common surface of the earth, a few stones put over it and then a covering of earth; that the second had been laid on this, had covered more or less of it in proportion to the number of bones, and was then also covered with earth, and so on. The following are the particular circumstances which give it this aspect. 1. The number of bones. 2. Their confused position. 3. Their being in different strata. 4. The strata in one part having no correspondence with those in another. 5. The different states of decay in these strata, which seem to indicate a difference in the time of inhumation. 6. The existence of infant bones among them." p. 178. First Paris Ed. The

number of bones in this barrow, or mound, which was only 40 feet in diameter at the base, and above 12 in height, authorized the conjecture that it contained a thousand skeletons. Now, as all those numerous mounds, or barrows have the most obvious similarity, we may conclude, that what is true of one of them, is, ceteris paribus, applicable to all. The only difference consists in their dimensions. I visited one, situated on the low grounds of the Kanhawa, which might be almost called the pyramid of the west. Its base measured 140 yards in circumference; its altitude is very nearly 40 feet. It resembles a truncated cone; upon the top there is a level of 12 or 13 feet in diameter. A tall oak, of two feet and a half in diameter, which had grown on the top, and had long looked down upon the humbler forresters below, had experienced a revolutionary breeze, which swept it from its majestic station, apparently, above 6 or 7 years before my visit. Within a few miles of this, stands another, which is said to be higher. No marks of excavation, near the mound, are to be seen. On the contrary, it is probable, from the examination which was made, that the earth composing the mound was brought from some distance; it is also highly probable, that this was done at different periods, for we cannot believe, that savages would submit to the patient exertion of labour requisite to accomplish such a work, at any one undertaking. Near to this large one are several upon a much smaller scale. But, if that upon the Rivanna, which was so accurately examined, contained the bones of a thousand persons, this upon the Kanhawa would contain forty times that number, estimating their capacities as cones. But who will believe, that war has ever been glutted with so many Indian victims by any one battle? The probability seems to be, that those mounds, formed upon so large a scale, were national burying places; especially as they are not connected with any particular enclosure; whilst those upon a smaller scale, and which are immediately connected with such a work, were the repositories of those, who had there once enjoyed a fixed habitation. But whether this conjecture be admitted or not, the inference, from what has been said under this head, that those enclosures could not be designed as fortifications, will, I think, be obvious to every one.

3dly. Because those supposed fortifications, not unfrequently lie at the very bottom of a hill, from which stones might be rolled in thousands into every part of them, to the no small annoyance, we may readily conceive, of the besieged.

4thly. Because, in those works which are remote from a river, or a creek, you find no certain indications of a well; and yet that water is a very necessary article to a besieged army, will be acknowledged on all hands.

5thly. Because those works are so numerous, that, supposing them to be fortifications, we must believe every inch of that very extensive country in which they are found had been most valiantly and obstinately disputed. For, upon the Kanhawa, to the extent of 80 or an 100 miles, and also upon many of the rivers which empty their waters into it, there is scarcely a square mile in which you will not meet with several. Indeed they are as thick, and as irregularly dispersed, as you have seen the habitations of farmers, or planters, in a rich and well settled country, but, notwithstanding their frequency, you no where see such advantageous positions selected, as the nature of the ground, and other circumstances would immediately have recommended to the rudest engineer, either for the purpose of opposing inroads, or of giving protection to an army which was too weak to withstand an invading enemy. The union of Elk and Kanhawa rivers affords a point of defence which could not have escaped the attention of any people; and yet we find no fortification at this place, but many dispersed through the low grounds in its vicinity.

I could add many other reasons; I might observe that some are upon so small a scale, whilst others are upon one so large, as equally to oppose the idea of their being places of defence. If one of 40 or 50 yards in diameter should be deemed too small for a defensive work, what shall we say to that whose outline embraces 50, or even an 100 acres? What tribe of Indians would furnish men sufficient to defend such a breastwork in all its points? But I believe the reasons assigned, when collectively taken, will be deemed conclusive; or, as abundantly establishing a perfect conviction, that these western enclosures were not designed for fortifications. This was my ob-

ject. What was the real design of them may be left to future inquiry. It is true, that we want here a compass to guide us, and are left to find our way through this night of time, in the best manner we can. I have already said, that those enclosures carried along with them strong evidence of their being fixed habitations. If so, then they were designed merely as lines of demarkation, shewing the particular spot, or portion of ground, which a family wished to appropriate; and indeed, they may be considered as exemplars of the manner in which land limits would be ascertained, previous to that period, when geometry begins to point out a mode more worthy of intelligent beings. This rude mode might, in a sequel of years, have introduced a geometry among the Aborigines of America. Though they had not a Nile to obliterate land marks, still the desire of saving labour would produce in one case, what anxiety to preserve property did in the other. If the same mode has not been continued, it has arisen from the means, which European or American art has supplied, of accomplishing the same end with much more facility.

The people inhabiting this country must have been numerous. The frequency of their burying places is a proof. The traveller finds them in every direction, and often, many in every mile. Under a mild climate, a people will always multiply in proportion to the quantity of food, which they can procure. Here, the waters contain fish in considerable abundance, some weighing not less than 60 or 80 pounds. Not far distant are those extensive and fertile plains, which were crowded with wild animals. The mildness of the climate is also remarkable. It appears to equal that of Richmond or Williamsburg; though the huge range of mountains which attend the Allegheny have not yet disappeared, and though the latitude of the place where Elk and Kanhawa rivers meet, according to an observation which I made with an imperfect instrument, is 38° 2′. All these circumstances were highly favorable to population; and also to permanent residence. Another circumstance, the face of the country, or locality, would serve to prevent this increase of population from diffusing itself on every side, and consequently would condense a tribe;

for the Kanhawa and its tributary streams are hemmed in by high and craggy hills, often approaching to mountains, and beyond which, to a considerable extent, the country in general is fit only for the habitation of wild beasts.

It is true, that on the N. W. side of the Ohio, there are works, which seem to claim higher pretensions to the rank assigned them. They present more elevated parapets, deeper ditches, with other indications of military art. Perhaps, however, when more accurately examined, in all their aspects, they will be found to be only the habitation of a chief of some powerful tribe. The love of distinction prevails with no less force in the savage, than the civilized breast. M'Kinzie, in his unadorned narratives, mentions frequently the habitation of the chief or king, as much larger, and even as commodious, when compared with those of inferior rank. In latitudes so high as those which he traversed with heroic perseverance, necessity compelled the savage to contrive more warm and durable habitations; but the same principle which would give marks of distinction to the residence of the chieftain in one climate, would produce the same effect in any other, though they might assume different appearances. Besides, it might not be improper to recollect in an examination of those works, that the French began to build forts in the Miamis, and Illinois country, as early as the year 1680; and that they were afterwards systematically continued until the loss of Canada.

I cannot conclude this letter, already, I fear, too long, without mentioning another curious specimen of Indian labour, and of their progress in one of the arts. This specimen is found within four miles of the place whose latitude I endeavoured to take, and within two of what are improperly called *Burning Springs*, upon a rock of hard freestone, which lies sloping to the south, touching the margin of the river, and presents a flat surface of above 12 feet in length and 9 in breadth, with a plane side to the east of 8 or 9 feet in thickness.

Upon the upper surface of this rock, and also upon the side, we see the outlines of several figures, cut without relief, except in one instance, and somewhat larger than the life. The depth of the outline may be half an inch; its width three

quarters, nearly, in some places. In one line ascending from the part of the rock nearest the river, there is a Tortoise; a spread Eagle, executed with great expression, particularly the head, to which is given a shallow relief; and a child, the outline of which is very well drawn. In a parallel line, there are other figures; but among them that of a woman only can be traced. These are very indistinct. Upon the side of the rock, there are two awkward figures, which particularly caught my attention. One is that of a man, with his arms uplifted, and hands spread out, as if engaged in prayer. His head is made to terminate in a point; or rather, he has the appearance of something upon the head, of a triangular or conical form: near to him is another similar figure, suspended by a cord fastened to his heels. I recollected the story, which Father Hennepin relates of one of the missionaries from Canada who was treated in a somewhat similar manner; but whether this piece of seemingly historical sculpture has reference to such an event, can be only matter of conjecture. A Turkey badly executed, with a few other figures may also be seen. The labour and the perseverance requisite to cut those rude figures in a rock so hard, that steel appeared to make but little impression upon it, must have been great; much more so, than making of enclosures in a loose and fertile soil.

Yours, &c.

JAMES MADISON.

B. S. Barton, M. D. one of the V. P. of the A. P. S.